

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
29 January 2004 (29.01.2004)

PCT

(10) International Publication Number
WO 2004/009750 A1

(51) International Patent Classification⁷: C11B 9/00,
A61Q 13/00, 15/00

(74) Agent: KEITH. W. NASH & CO., 90-92 Regent Street,
Cambridge, CB2 1DP (GB).

(21) International Application Number:
PCT/GB2003/003083

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC,
SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date: 16 July 2003 (16.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0216633.8 18 July 2002 (18.07.2002) GB
0227740.8 28 November 2002 (28.11.2002) GB

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant (*for all designated States except US*): QUEST
INTERNATIONAL B.V. [NL/NL]; Huizerstraatweg 28,
NL-1411 GP Naarden (NL).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): PERRING, Keith,
Douglas [GB/GB]; 14 Malvern Road, Ashford, Kent TN24
8HS (GB). BRADSHAW, David, Jonathan [GB/GB];
10 Rookery Close, Ashford, Kent, TN24 9RP (GB). BE-
HAN, John, Martin [GB/GB]; The Old Forge, Boughton
Aluph, Kent TN25 4JP (GB). CAWKILL, Paula, Maria
[GB/GB]; 21 Grey Willow Gardens, Ashford, Kent, TN23
5GG (GB).

Declaration under Rule 4.17:

— *of inventorship (Rule 4.17(iv)) for US only*

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2004/009750 A1

(54) Title: IMPROVEMENTS IN OR RELATING TO PERFUME COMPOSITIONS

(57) Abstract: A perfume composition comprising a perfume component capable of inhibiting the production of odoriferous steroids by micro-organisms on the skin. The perfume component is capable of inhibiting the biotransformation of androstadienols to androstenones.

Title: Improvements in or relating to perfume compositions

Field of the Invention

This invention relates to perfume compositions, to products containing such perfume compositions, and to the use of a perfume component or perfume composition to deliver a deodorant effect. In particular, the invention relates to perfume components, mixtures thereof, and perfume compositions for reducing or preventing body malodour.

Background to the Invention

It is known that, at the point of secretion, sweat is odourless. Body malodour is the result of a variety of biotransformations of components of sweat by certain species of natural micro-organisms which live on the surface of the skin. These transformations produce a number of volatile odoriferous compounds such as steroidal compounds (e.g. 16-androstanes), amongst others, which contribute to body malodour.

There are three types of personal product routinely used to combat body malodour: perfumes, antiperspirants and deodorants. Products such as soaps, shower gels, body washes and laundry products are also intended to combat body malodour.

Perfumes may simply mask body malodour. However perfume compositions have been disclosed which exhibit a deodorant action. EP-B-3172, EP-A-5618, US-A-4304679, US-A-4322308, US-A-4278658, US-A-4134838, US-A-4288341 and US-A-4289641 all describe perfume compositions which exhibit a deodorant action when applied to human skin or when included in a laundry product used to launder textiles.

Antiperspirants work by blocking the sweat glands, thereby reducing perspiration.

Antimicrobial agents used in deodorants are designed to reduce the population, inhibit the

growth or diminish the metabolic activities of micro-organisms living on the surface of the skin. Typical agents of this nature include ethanol and Triclosan (2',4,4'-trichloro-2-hydroxydiphenyl ether) which are well known to exert antimicrobial effects. The use of common deodorant actives results in a non-selective antimicrobial action exerted upon most of the skin's natural microflora. This is an undesirable disadvantage of such deodorant formulations, since the natural microflora provides a protective barrier (colonisation resistance) against invasion by potentially pathogenic bacteria.

US-A-5643559 (Colgate-Palmolive Company) discloses deodorant active materials having an effective amount of Zn^{2+} ions for inhibiting bacterial exoenzymes responsible for the production of axillary malodour. The bacterial exoenzymes are further characterised as aryl sulphatase or beta glucuronidase.

DE-4343265 (Henkel) describes deodorant compositions comprising saturated dioic acid (C3-C10) esters. The active inhibits a sweat decomposing esterase and the compositions are said not to disturb the skin's natural microflora.

WO 94/07837 (Unichema) describes certain novel unsaturated dioic acids having between 8 and 22 carbon atoms. The potential use of these acids to treat malodour is also described.

Gower et al. (*J. Steroid Biochem. Molec. Biol.*, (1994) Vol. 48, No. 4, pp 409-418) discloses the importance of certain bacterial enzymes involved in bacterial steroid metabolism in the production of odoriferous steroids, and proposes a series of interconversions between some of these metabolites.

Talalay, P.: Hydroxysteroid Dehydrogenases in *The Enzymes*, VII, 2nd Ed., (Boyer, P., Lardy, H., and Myrback, K., eds.), Academic Press, NY, 177, 1963, describes that 3[[alpha]] hydroxysteroid dehydrogenase from *Pseudomonas testosteroni* is inhibited by heavy metals and sulfhydryl-binding reducing agents.

Nakajin et al. (*J. Steroid Biochem. Molec. Biol.*, (1991) Jan;38(1):95-9) discloses that the -conazole antifungal agents have a mode of action based on the inhibition of sterol metabolism. The activity of the enzyme (16-ene-C19-steroid synthesizing enzyme) responsible for the conversion of C21-steroids to 16-ene-C19-steroids, which was localized on pig testicular microsomes, was inhibited by some typical imidazole antifungal compounds such as clotrimazole, econazole, miconazole and ketoconazole which are known to be universal inhibitors of cytochrome P-450 dependent enzymes.

Lavallee et al. (*J. Steroid Biochem. Molec. Biol.* (1993) Jul;46(1):73-83) describes 20 beta-hydroxypregnenolone as a more potent inhibitor of 5,16-androstadien-3 beta-ol synthetase than of 17-hydroxylase and for the latter enzyme activity, the Ki(app) was lower than that for 17-hydroxypregnenolone itself.

Watabe et al. (*J. Biol. Chem.* (1985) Jul 25;260(15):8716-20) describes that the C16-double bond of the steroid androsta-5,16-dien-3 beta-ol, is oxidized by male rat liver microsomes to 16 alpha,17 alpha-epoxyandrost-5-en-3 beta-ol; 16 beta,17 beta-epoxyandrost-5-en-3 beta-ol; androst-5-ene-3 beta,16 alpha,17 beta-triol; and androst-5-ene-3 beta,16 beta,17 alpha-triol, and this transformation is strongly inhibited with CO.

WO 00/01355 and WO 00/01358 describe agents useful in preventing or reducing body malodour by inhibiting the production of odiferous steroids, wherein the agents inhibit the bacterial enzymes, bacterial 4-ene reductase and/or 5 α -reductase. Examples of active agents are described as dicarboxylic acids, phenyl compounds, monoterpene derivatives, sterols, flavonoids, steryl esters, 2,7-naphthalenediol and oxyquinoline (WO 00/01355), and certain perfume components (WO 00/01358).

Several steroids, notably 5 α -androst-16-en-3-one (5 α -androstenone), 5 α -androst-16-en-3 α -ol (3 α -androstenol) and androsta-4,16-dien-3-one (androstadienone) are known to be highly odorous in the context of human axillary odour. The biotransformations effected by a micro-organism on the components of sweat to produce such odiferous products or

intermediates, occur via a number of possible, and typically, ill-defined metabolic pathways.

It has been suggested in the prior art (Gower et al) that odorous steroids, e.g. androstenones, are formed by the biotransformation of typically non-odorous steroids i.e. steroids present at levels below the threshold of human olfactory detection, by the action of micro-organisms present on the skin surface. More particularly, 5α -androst-5,16-dien- 3β -ol (androstanediol) was a source of the odorous androstenones.

Summary of the Invention

The present invention is based on extensive testing of perfume components to determine whether a particular component is capable of inhibiting the biotransformation of androstanediols to androstenones, particularly 5α -androst-16-en-3-one, and thus is capable of inhibiting the production of odoriferous steroids by micro-organisms on the skin surface. Based on this testing, perfume components were identified, which whilst known, possess hitherto unappreciated deodorant properties. The invention thus enables perfume compositions to be defined that reduce or prevent body malodour.

Accordingly, in one aspect, the present invention provides a perfume composition comprising at least 30% by weight of one or more of the following perfume components; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, dihydromyrcenol, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, alpha-terpineol, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.

The following perfume components are useful in the perfume compositions defined herein:

Armoise Tunisian oil;

para-tert.butylphenylacetonitrile (also known as 'Marenil' where MARENIL is a trade mark of Quest International);

dihydrolinalol (3,7-dimethyloct-6-en-3-ol);

N-ethyl-N-(3-methylphenyl)propionamide (also known as 'Agarbois' where AGARBOIS is a trade mark of Quest International);

4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol;

ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate;

2-ethyl-N-methyl-N-(3-methylphenyl)butanamide (also known as 'Paradisamide' where PARADISAMIDE is a trade mark of Quest International) ;

dihydromyrcenol (2,6-dimethyl-7-octen-2-ol);

(4-isopropylcyclohexyl)methanol;

3-methyl-5-phenylpentan-1-ol (also known as 'Mefrosol' where MEFROSOL is a trade mark of Quest International);

2,2,2-trichloro-1-phenylethyl acetate (also known as Rosacetone or Roseacetone);

isobornyl acetate;

allyl amyl glycolate ('2-methylbutyloxyacetic acid, 2-propenyl ester');

alpha-terpineol;

acetyl cedrene (also known as 'Lixetone' where LIXETONE is a trade mark of Quest International);

tetrahydrogeraniol;

citronellal;

cuminic aldehyde (para-isopropylbenzaldehyde);

cis-jasmone;

methyl octyl acetaldehyde (2-methyldecenal);

gamma-octalactone (5-butyldihydrofuran-2(3H)-one);

octyl acetate;

pine American oil;

peppermint (Chinese);

1,3,3-trimethyl-2-norbornanyl acetate (fenchyl acetate);

1,3,3-trimethyl-2-norbornanol (fenchyl alcohol);

gamma-nonalactone;

octahydro-2H-chromen-2-one (also known as 'Octahydrocoumarin' where OCTAHYDROCOUMARIN is a trade mark of Quest International);

cis-4-decenal;

3-(3-isopropylphenyl)butanal.

The term "perfume component" is used herein to represent a material which is added to a perfume composition to contribute to the olfactory properties of the composition. A perfume component can be acceptably employed to provide odour contributions to the overall hedonic performance of products. Typically, a perfume component will be generally recognised as possessing odours in its own right, will be relatively volatile and often has a molecular weight within the range 100 to 300. Typical materials which are perfume components are described in "Perfume and Flavour Chemicals", Volumes I and II (Steffan Arctander, 1969).

For the purposes of the present invention, by perfume composition is meant a mixture of individual perfume components, and optionally one or more suitable diluents, which is used to impart a desired odour to the skin and/or product for which an agreeable odour is indispensable or desirable. Commonly used diluents are benzyl benzoate, diethyl phthalate, dipropylene glycol and isopropyl myristate. The concentration of perfume components referred to herein is relative to the total concentration of perfume components present in the composition, i.e. excludes any diluents.

To deliver high deodorant effects the perfume component(s) are preferably present in a perfume composition in an amount of 40% by weight of the total weight of the perfume composition, more preferably at least 45%, and most preferably at least 60%.

Additionally, or alternatively, a perfume composition in accordance with the present invention preferably comprises at least 3, more preferably at least 5, and even more preferably at least 10 of the specified perfume components.

Thus, in a further aspect, the present invention provides a perfume composition comprising at least 3 of the following perfume components; Armoise Tunisian oil, para-tert-butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, dihydromyrcenol, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, alpha-terpineol, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalacone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.

The perfume components useful herein in a perfume composition may be incorporated into deodorant products which include, but are not limited to, body deodorants and antiperspirants including roll ons, sprays, gel products, stick deodorants, antiperspirants, shampoos, soaps, shower gels, talcum powder, hand creams, skin conditioners, sunscreens, sun tan lotions, and hair conditioners.

Thus, in an even further aspect, the present invention provides a deodorant product comprising a perfume composition in accordance with the invention.

A deodorant product preferably comprises at least 0.05% to 4%, more preferably 0.1% to 2% of a perfume composition by weight of the deodorant product.

The perfume components useful herein may also be conveniently employed for deodorant purposes by incorporation into other products, e.g. laundry and household products such as rinse conditioners, household cleaners and detergent cleaners. The perfume components

can be incorporated into textiles themselves during their production using techniques known in the art, to provide deodorant protection.

In a preferred embodiment of the present invention, an Odour Reduction Value, measured in human axillae as described in Example 4, of at least 10%, more preferably at least 30%, and particularly at least 45% is obtained.

One or more of the perfume components useful herein may be mixed with other perfume components, e.g. perfume components of the prior art having deodorant properties, to formulate perfume compositions with desired deodorant and hedonistic properties.

In one such embodiment, there is provided a perfume composition as defined herein, wherein the perfume composition additionally comprises at least 15% by weight, preferably at least 30% by weight, of one or more of the following perfume components: acetyl di-iso-amylene, acetyl tributyl citrate, aldehyde C10 (i.e. decenal), Amber AB 358 (available from Quest International), amyl salicylate, anisyl acetate, Azarbre*, benzyl salicylate, cis-3-hexenyl salicylate, citral, citronellol, clove leaf distilled, coriander, cyclamen aldehyde, decen-1-ol, dihydroeugenol, diphenylmethane, Dupical*, Empetaal*, geraniol, helional i.e. 2-methyl-3-(3,4-methylene-dioxyphenyl)propanal), Ionones (alpha- and beta-), Jasmacyclene*, 3-(4-methyl-4-hydroxyamyl)-3-cyclohexene carboxaldehyde, methyl eugenol, methyl isoeugenol, Ortholate*, para-cresyl methyl ether, 2-phenylethyl alcohol, para tert. butyl cyclohexyl acetate, rose oxide (racemic), styrallyl acetate, tetrahydrolinalol, and vanillin; wherein all asterisked materials are trade marks of Quest International.

In a preferred embodiment, there is provided a perfume composition comprising:

(i) at least 30% by weight of the perfume composition of at least 3 of the following perfume components: N-ethyl-N-(3-methylphenyl)propionamide, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, dihydromyrcenol, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, alpha-terpineol, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic

aldehyde, cis-jasmone, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal; and

(ii) at least 30% by weight of the perfume composition of one or more of the following perfume components: acetyl di-iso-amylene, acetyl tributyl citrate, aldehyde C10, Amber AB 358, amyl salicylate, anisyl acetate, Azarbre, benzyl salicylate, cis-3-hexenyl salicylate, citral, citronellol, clove leaf distilled, coriander, cyclamen aldehyde, decen-1-ol, dihydroeugenol, diphenylmethane, Dupical, Empetaal, geraniol, helional, alpha-ionone, beta-ionone, Jasmacylene, 3-(4-methyl-4-hydroxyamyl)-3-cyclohexene carboxaldehyde, methyl eugenol, methyl isoeugenol, Ortholate, para-cresyl methyl ether, 2-phenylethyl alcohol, para tert. butyl cyclohexyl acetate, rose oxide, styrallyl acetate, tetrahydrolinalol, and vanillin.

Also included within the scope of the invention is a method, particularly a cosmetic method, for reducing or preventing body malodour by topically applying to human skin a composition comprising a perfume component selected from at least one of the following; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, dihydromyrcenol, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, alpha-terpineol, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.

Preferably, the composition is a perfume composition.

Preferred perfume components for use in the method as defined above are selected from one or more of the following; Armoise Tunisian oil, para-tert.butylphenylacetonitrile,

dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.

The method thus comprises topically applying to human skin, one or more of the specified perfume components which is(are) capable of reducing or preventing body malodour by inhibiting the production of odoriferous steroids by micro-organisms present on the skin surface, wherein the perfume component is capable of inhibiting the biotransformation of androstadienols to androstenones. Typically, the specified perfume components inhibit the production of odoriferous steroids by Coryneform bacteria present on the skin surface, particularly *Corynebacterium spp.* The inhibitory effect of the perfume components useful herein can be achieved antimicrobially or sub-lethally.

The antimicrobial effects of compounds, e.g. perfume components, are usually divided into two types; they can either inhibit bacterial growth (bacteriostatic action) or alternatively they can act by directly killing existing viable bacteria (bactericidal action).

The bacteriostatic action of a compound "X" such as a perfume component, can be tested for *in vitro* by inoculating a standard, small number of bacteria into broths containing an appropriate range of concentrations of X. The broths are then incubated for a suitable time, and growth compared with a control containing no inhibitor. The broth containing the lowest concentration of X which shows reduction of growth compared to the control broth is defined as the minimum inhibitory concentration (MIC).

The determination of bactericidal action of a compound "Y" such as a perfume component is carried out by adding various concentrations of compound Y to replicate broths

containing relatively high, standard numbers of bacteria. After a certain period allowing any antibacterial activity to take place, aliquots of the bacterial cultures are diluted (usually in 10-fold steps) and dispensed onto agar plates. The plates are incubated with the expectation that each viable cell should produce a visible colony. The numbers of colonies are multiplied to take account of the dilution, to establish the number of viable cells in the broths. Once again, the broths containing compound Y are compared with an untreated control broth. The minimum concentration of compound Y which causes a reduction in the viable number of bacteria is the minimum bactericidal concentration (MBC). MBC can also be expressed in terms of the MBC required to produce a certain degree of killing (for example, a $3 \log_{10}$ reduction in count, equivalent to a 99.9% kill). Still further, the MBC can be expressed in kinetic terms - the time of exposure to an agent required for a given MBC effect.

A further possibility is that the process of inhibition could be sub-lethal (or sub-MIC), whereby the perfume components interfere with the metabolic process, but typically do not inhibit bacterial growth.

Preferably, the bacterial production of odiferous steroids is reduced by at least 50%, more preferably by at least 70%, particularly by at least 80%, and especially by at least 90%. Three modes of achieving a reduction of odiferous steroid production are possible. In the first mode, the perfume components (or perfume compositions) may act by direct (overt antimicrobial) killing of skin bacteria, e.g. by more than 10-fold; in the second mode, they may act on odiferous steroid generation whilst maintaining a microbial cell viability of at least 70%; in the third mode, they may inhibit odiferous steroid generation, at a concentration below the minimum inhibitory concentration (MIC), determined as described in Example 1 below. The third mode is preferred, since this provides malodour counteraction benefits, whilst leaving the natural skin microflora undisturbed. Thus, preferably the bacterial production of odiferous steroids can be reduced or eliminated without significantly disturbing the skin's natural microflora. This may be achieved by inhibiting the bacterial enzymes responsible for the production of odiferous steroids, in particular the androstenones such as 5α -androst-16-en-3-one.

In an even further aspect the present invention provides use of one or more of the following perfume components; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonolactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal, as a deodorant active.

In a still further aspect the present invention provides use of one or more of the following perfume components; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonolactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal, in the manufacture of a composition for reducing or preventing body malodour.

Based on the MIC value evaluated for a particular perfume component, it is possible to select and combine those perfume components having low MIC values which are likely to be antimicrobially active, and to formulate a deodorant product which has some degree of anti-microbial activity. An example of this is a product including an antimicrobially effective amount, typically between 0.05% and 4% by weight, preferably between 0.1% and 2% by weight, more preferably between 0.5% and 1.5% by weight, of a perfume

composition comprising at least 30% by weight of one or more of the following perfume components:

N-ethyl-N-(3-methylphenyl)propionamide;
3-methyl-5-phenylpentan-1-ol;
2,2,2-trichloro-1-phenylethyl acetate;
pine American oil;
cis-4-decenal;
4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol;
cuminic aldehyde;
methyl octyl acetaldehyde;
Armoise Tunisian oil;
dihydromyrcenol;
allyl amyl glycolate;
alpha-terpineol;
cis-jasmone;
peppermint (Chinese);
gamma-nonalactone;
octahydro-2H-chromen-2-one;
para-tert.butylphenylacetonitrile;
dihydrolinalol;
tetrahydrogeraniol; and
1,3,3-trimethyl-2-norbornanol;

optionally in combination with perfume components having known high antimicrobial activity such as phenylethyl alcohol, geraniol, cinnamic acid, benzyl alcohol, and citral.

Likewise, it is also possible to select and combine those perfume components with higher MIC values which are likely to sub-lethally inhibit odoriferous steroid generation, and to formulate a deodorant product with minimal antimicrobial activity. Such a product may include, for example, appropriate levels of a perfume composition, typically between

0.05% and 4% by weight of the deodorant product of a perfume composition, preferably between 0.1% and 2% by weight, more preferably between 0.5% and 1.5% by weight, the perfume composition comprising at least 30% by weight of one or more of the following perfume components:

ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate;
2-ethyl-N-methyl-N-(3-methylphenyl)butanamide;
(4-isopropylcyclohexyl)methanol;
isobornyl acetate;
acetyl cedrene;
citronellal;
gamma-octalactone;
octyl acetate;
1,3,3-trimethyl-2-norbornanyl acetate;
3-(3-isopropylphenyl)butanal.

The invention also provides the use of a perfume component to inhibit the biotransformation of androstadienols to androstenones, in particular the biotransformation of androsta-5,16-dien-3 β -ol to 5 α -androst-16-en-3-one.

The invention further provides the use of a perfume composition, comprising at least 30% by weight of one or more perfume components capable of inhibiting the biotransformation of androstadienols to androstenones, to reduce body malodour.

The invention further provides the use of a deodorant product, comprising a perfume component, to reduce body malodour by inhibiting the biotransformation of androstadienols to androstenones.

The invention still further provides a method of producing a perfume composition which comprises (i) evaluating perfume components on the ability to inhibit the biotransformation of androstadienols to androstenones, (ii) selecting perfume components on the ability to

inhibit the biotransformation of androstadienols to androstenones, and (iii) mixing together two or more of said selected perfume components, optionally with other perfume components.

The invention still further provides use of a perfume composition comprising a perfume component to reduce body malodour, characterised in that the composition comprises at least 30% by weight of at least one of the perfume components specified in the paragraph bridging pages 5 and 6 above.

The invention is illustrated by the following examples.

Example 1: Minimum Inhibitory Concentration (MIC)

The minimum inhibitory concentration of a perfume component was determined by the following method.

A culture of the test strain - *Corynebacterium xerosis* NCTC 7243 (National Collection of Type Cultures, Public Health Laboratory Service, Central Public Health Laboratory, 61 Colindale Avenue, London, NW9 5HT) was grown in 100ml of tryptone soya broth (TSB) (Oxoid, Basingstoke, UK) for 16-24 hours, in a shaken flask at 37°C. The culture was then diluted in sterile 0.1% TSB (Oxoid, Basingstoke, UK) to give a concentration of bacteria of approximately 10⁶ colony forming units (cfu) per ml.

Perfume or perfume component samples were diluted in sterile TSB to give stock solutions with final concentrations of 40,000 ppm (perfume) or 20,000 ppm (perfume component). Each row of a standard, 96-well plastic microtitre plate (labelled A-H) was allocated to one sample, thus eight samples per plate. Row H contained only TSB for use as a bacterial control to indicate the degree of turbidity resulting from bacterial growth in the absence of any test material. Aseptically, 200µl of the initial dilution of perfume/perfume component was transferred to the 1st and 7th well of the appropriate row. All other test wells were filled with 100µl of sterile TSB using an 8-channel micro-pipette. The contents of each of

the wells in column 1 were mixed by sucking samples up and down in pipette tips, before 100 μ l was transferred to column 2. The same sterile pipette tips were used to transfer 100 μ l of each well in column 7, into the appropriate well in column 8. This set of eight tips was then discarded into disinfectant solution. Using eight fresh, sterile tips the process was repeated by transferring 100 μ l from column 2 into column 3 (and 8 into 9). The process was continued until all wells in columns 6 and 12 contained 200 μ l. After mixing, 100 μ l was discarded from wells in columns 6 and 12 to waste. Finally, 100 μ l of pre-diluted bacterial culture (approx. 10⁶ cfu/ml) was added, thus giving 200 μ l final volume in each well.

A blank plate was prepared for each set of eight samples in exactly the same way, except that 100 μ l of sterile 0.1% TSB was added instead of bacterial culture. This plate was used as the control plate against which the test plate(s) could be read. Test and control plates were sealed using autoclave tape and incubated for 18-30 hours at 37°C.

The microtitre plate reader (Model MRX, Dynatech Laboratories) was preset to gently agitate the plates and mix the contents. The absorbance at 540nm (hereinafter referred to for brevity and simplicity as "A₅₄₀") was used as a measure of turbidity resulting from bacterial growth. The control, un-inoculated plate for each set of samples was read first, and the plate reader then programmed to use the control readings to blank all other plate readings for the inoculated plates for the same set of test materials (i.e. removing turbidity due to perfume and possible colour changes during incubation). Thus, the corrected readings generated were absorbances resulting from turbidity from bacterial growth. The MIC was taken as the concentration of perfume/perfume component required to inhibit growth so that the change in absorbance during the incubation period was < 0.2 A₅₄₀.

Example 2: Steroid Biotransformation Assay

The ability of perfume components and mixtures of these components to inhibit the biotransformation of androstadienols to androstenones was determined *in vitro* using the method described below.

Corynebacterium sp. NCIMB 41018 (National Collections Of Industrial, Food and Marine Bacteria, 23 St Machar Drive, Aberdeen, AB24 3RY, Scotland, UK) (also known as *Corynebacterium* G41) was grown in 100ml of TSB supplemented with 0.1% w/v yeast extract (Oxoid) and 0.1% v/v Tween 80 (Sigma, Poole, UK) for 18-30 hours, in a shaken flask at 37°C. This culture was then harvested by centrifugation, and resuspended in 100 ml of biotransformation medium (consisting of a sterile semi-synthetic basal medium containing KH₂PO₄ 1.6 g/l; (NH₄)₂HPO₄ 5 g/l; Na₂SO₄ 0.38 g/l; yeast nitrogen base 3.35 g/l; yeast extract 0.5 g/l; Tween 80 0.2 g/l; Triton X-100 0.2 g/l and MgCl₂.6H₂O 0.5 g/l).

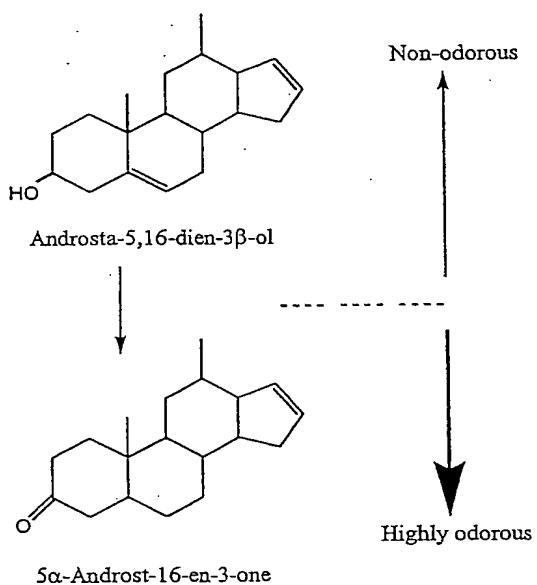
Substrate androsta-5,16-dien-3β-ol (50mg/assay) was added to the bacterial suspension and incubated for 72 hours at 37°C with agitation (at 220-250rpm) in a 250 ml, baffled-Erlenmeyer flask.

Following biotransformation of androsta-5,16-dien-3β-ol to androst-16-en-3-one the bacteria were harvested and the cell pellet dried in air and then under vacuum.

The dried cells were then crushed and suspended in 100 ml of a mixture of diethyl ether, chloroform, ethanol, ethyl acetate and acetone (1:2:1:1:1 v/v, respectively), and stirred for 16 hours. The supernatant was then reduced to half its volume, filtered and evaporated at 30°C and 15 mmHg pressure. The resulting residue was re-dissolved in 5 ml AR grade methanol. Following sonication, the sample was analysed by HPLC on a Phenomenex Luna 5 micron, C18 reverse-phase HPLC column coupled to a Millipore-Waters 600E System Controller. Elute was passed through a Millipore-Waters 486 Tuneable absorbance detector and relative amounts of the steroid metabolite was determined by a Hewlett Packard HP 3396A Integrator printer. The composition of the HPLC mobile phase was aqueous methanol. The flow rate was 0.8 ml/min. Calibration curves were used to determine the molar quantities of pure steroid metabolites in biotransformed mixtures and hence the conversions.

Metabolites were analysed by HPLC-MS to determine their structure.

The biotransformation of androsta-5,16-dien-3 β -ol to 5 α -androst-16-en-3-one by *Corynebacterium* NCIMB 41018 is as shown below:



It will be appreciated that the Coryneform bacteria used in Examples 1 and 2 are not the same strains. This is because the nutrient Tween-80 required for growth by *Corynebacterium* NCIMB 41018 (Example 2) is not suitable for inclusion in the growth medium used for MIC testing. As described above, during MIC testing, measurements are taken of the turbidity resulting from bacterial growth. Tween-80 when dissolved in an aqueous growth medium turns the medium cloudy. Thus, the addition of Tween-80 to a growth medium to be used for MIC testing would interfere with the readings, making an accurate determination of the turbidity due to bacterial growth impossible. Thus, a similar axillary *Corynebacterium* strain (*C. xerosis* NCTC 7243) is used in the MIC test, which does not require this nutrient for growth. The susceptibility of *Corynebacterium xerosis* NCTC 7243 to a variety of perfume components is likely to be very similar to that of *Corynebacterium* NCIMB 41018 as they are from the same genus.

Example 3

Perfume A: Composition % by weight.

INGREDIENT	w/w%
AGARBOIS (Q)	15 *
CINNAMIC ALCOHOL	2
COUMARIN	1
DIHYDROMYRCENOL	8 *
GERANIUM OIL	2
HABANOLIDE (F)	3
LILIAL (G)	10
(4-ISOPROPYL CYCLOHEXYL)METHANOL	2 *
MEFROSOL (Q)	5 *
METHYL ANTHRANILATE	1
METHYL CEDRYL KETONE	4
METHYL DIHYDROJASMONATE (Q)	10
PHENYL ETHYL ALCOHOL	15
ROSACETONE	5 *
VANILLIN 5% IN DEP	17
total	100.00%

* Materials of the invention

Trademarks: 'Q' = Quest International; 'F' = Firmenich; 'G' = Givaudan

Perfume B: Composition % by weight.

INGREDIENT	w/w%
ACETYL CEDRENE	7.5 *
AGARBOIS (Q)	6 *
ALDEHYDE MNA 10% DEP	1
ALLYL AMYL GLYCOLATE (Q)	2.2 *
AMBER CORE (Q)	0.5
ARMOISE TUNISIAN	0.4 *
BANGALOL (Q)	0.5
BENZYL SALICYLATE (Q)	8.5

BERGAMOT OIL	7.5
BOURGEONAL (Q)	0.5
CARVONE LAEVO (Q) 10% DEP	1
CEDARWOOD VIRGINIAN OIL	1.1
cis-3-HEXENYL SALICYLATE	1.5
CISTULATE (Q) 10% DEP	2
CORIANDER	0.3
COUMARIN	0.6
CYCLOHEXYLOXYACETIC ACID, ALLYL ESTER	0.2
CYCLOPENTADECANOLIDE	2.2
DIHYDROMYRCENOL (Q)	13 *
ETHYLENE BRASSYLATE	1.5
GERANIUM OIL	1.4
HELIONAL	0.3
HEXYL CINNAMIC ALDEHYDE	2.5
IONONE (Q)	1.5
ISO AMBOIS (Q)	7.5
ISO BORNYL ACETATE	0.6 *
ISOBORNYL CYCLOHEXANOL	1.5
LAVANDIN OIL	0.3
LILIAL (G)	6.8
METHYL CHAVICOL	1.2
METHYL DIHYDROJASMONATE SUPER (Q)	6.4
MOSS OAKMOSS SYNTHETIC	0.2
NUTMEG PURE	0.2
PEPPERMINT CHINESE 10% DEP	3.5 *
PETITGRAIN PARAGUAY	0.2
ROSE OXIDE RACEMIC 10% DEP	0.5
STYRALLYL ACETATE	0.4
TERPINEOL ALPHA	2.5 *
TETRAHYDROLINALOL	4.5
total	100.00%

* Materials of the invention

Perfume C: Composition % by weight.

INGREDIENT	w/w%
ACETYL CEDRENE (Q)	7 *
AGARBOIS (Q)	15 *
ALDEHYDE MNA 10% DEP	2.5
BENZYL SALICYLATE (Q)	6.4

cis-JASMONE	1.2	*
CITRONELLAL	2.2	*
COUMARIN	1.3	
CYCLOPENTADECANOLIDE	6.6	
DIHYDROMYRCENOL (Q)	8.5	*
ETHYLENE BRASSYLATE	2.3	
HEXYL CINNAMIC ALDEHYDE	3.5	
ISO AMBOIS (Q)	7	
ISO BORNYL ACETATE	2.6	*
LILIAL (G)	5.4	
MARENIL (Q)	1.3	*
MEFROSOL (Q)	5.4	*
METHYL DIHYDROJASMONATE SUPER (Q)	7.6	
PETITGRAIN PARAGUAY	1.2	
TERPINEOL ALPHA	3	*
TETRAHYDROGERANIOL	10	*
total	100.00%	

* Materials of the invention

Perfume D: Composition % by weight.

INGREDIENT	w/w %	
4-(5-ETHYLBICYCLO[2.2.1]HEPTYL-2)-CYCLOHEXANOL	1.2	*
ACETYL CEDRENE (Q)	5.3	*
ALDEHYDE C11 (UNDECYLENIC ALDEHYDE) 10% DEP	1.4	
ALDEHYDE MNA 10% DEP	0.8	
ALLYL AMYL GLYCOLATE (Q)	1.3	*
ARMOISE TUNISIAN	0.2	*
BANGALOL (Q)	0.3	
BENZYL SALICYLATE (Q)	5.1	
BERGAMOT OIL	4.8	
CEDARWOOD VIRGINIAN OIL	1.1	
CITRONELLAL	2	*
CITRONELLOL	6.9	
CYCLOPENTADECANOLIDE	2.3	
DIHYDROMYRCENOL (Q)	15.8	*
ETHYLENE BRASSYLATE	8.8	
FENCHYL ACETATE	2.5	*
HEXYL CINNAMIC ALDEHYDE	5.1	
IONONE (Q)	3.5	
ISOBORNYL CYCLOHEXANOL	1.8	
METHYL DIHYDROJASMONATE SUPER (Q)	5.5	

PARA TERT BUTYL CYCLOHEXYL ACETATE	3.4	
PARADISAMIDE (Q)	2.8	*
PEPPERMINT CHINESE 10% DEP	4.3	*
PHENYLETHYL ALCOHOL	6	
ROSE OXIDE RACEMIC 10% DEP	2.1	
ROSEACETONE	3.7	*
TETRAHYDROGERANIOL	2	*
total	100.00%	

* Materials of the invention

Perfume E: Composition % by weight.

INGREDIENT	w/w%
4-(5-ETHYLBICYCLO[2.2.1]HEPTYL-2)-CYCLOHEXANOL	2.3
AGARBOIS (Q)	4
ALDEHYDE C11 (UNDECYLENIC ALDEHYDE) 10% DEP	1.2
AMBER CORE (Q)	4.3
CARVONE LAEVO (Q) 10% DEP	3.8
CEDARWOOD VIRGINIAN OIL	1.8
cis-JASMONE	0.5
CISTULATE (Q) 10% DEP	0.9
CITRONELLOL	3.6
CORIANDER	0.2
COUMARIN	0.9
DIHYDROMYRCENOL (Q)	4.5
ETHYLENE BRASSYLATE	6.2
FENCHYL ACETATE	3.6
HEXYL CINNAMIC ALDEHYDE	6.8
HEXYL SALICYLATE	7.5
LILIAL (G)	6.5
MARENIL (Q)	2.6
METHYL CHAVICOL	0.4
METHYL DIHYDROJASMONATE SUPER (Q)	3.5
METHYL OCTYL ACETALDEHYDE 10% DEP	5.5
MOSS OAKMOSS SYNTHETIC	0.2
PEPPERMINT CHINESE 10% DEP	3.4
PETITGRAIN PARAGUAY	2.1
PHENYLETHYL ALCOHOL	7.1
TERPINEOL ALPHA	6.4
TETRAHYDROGERANIOL	8.2
TETRAHYDROLINALOL	2

total 100.00 %
* Materials of the invention

Example 4: Product Base Examples

The following are typical formulations of deodorant products which comprise a perfume composition in accordance with the invention. These formulations are made by methods common in the art.

1. Deodorant Sticks

Ingredient	Content (% by weight)	
	Formulation 1A	Formulation 1B
Ethanol		8.0
Sodium Stearate	7.0	6.0
Propylene glycol	70.0	12.0
Perfume	1.5	2.0
PPG-3 Myristyl ether		28.0
PPG-10 Cetyl ether		10.0
Cyclomethicone		34.0
Water	21.5	

2. Aerosols

Ingredient	Content % by weight	
	Formulation 2A	Formulation 2B
Ethanol B	up to 100	
Propylene glycol		as required

Perfume	2.0	1.2
Chlorhydrol microdry		31.8
Silicone Fluid DC344		up to 100
Bentone gel IPP		13.65
Dimethyl ether	20.0	
Concentrate		22.0
Water	23.0	

Ingredient	Content % by weight
------------	---------------------

Formulation 2C

Ethanol (Denatured)	up to 100
Perfume	1.0
DC345 Fluid ⁽ⁱ⁾	15.0
Hydrocarbon Propellant, 30 psig ⁽ⁱⁱ⁾	60.0

- (i) DC345 fluid (INCI name - CYCLOPENTA-SILOXANE) is a volatile, low viscosity, silicone fluid. It is non-greasy providing a light, silky feel on the skin.
- (ii) The hydrocarbon propellant can be any deodorised blend of n-butane, n-propane and isobutane having a pressure of 30 pounds per square inch gauge or 2.109 kg/cm² gauge (308 kPa).

3. Roll ons

Ingredient	Content % by weight	
	Formulation 3A	Formulation 3B
Ethanol	to 100%	60.0
Klucel MF		0.65

Cremphor RM410		0.5
Perfume	0.5	1.0
AZTC*	20.0	
Cyclomethicone	68.0	
Dimethicone	5.0	
Silica	2.5	
Water		37.85

* Aluminium zirconium tetrachlorohydro glycinate

Perfume compositions A to E embodying this invention (see Example 3 above) were prepared and tested for deodorant action in underarm products, particularly an aerosol product of Formulation 2C, using an Odour Reduction Value test generally as described in US 4,278,658.

The Odour Reduction Value test was carried out using a panel of 40 Caucasian male subjects. A standard quantity (approximately 1.75g) of an aerosol product containing one of the perfume compositions or an unperfumed control was applied to the axillae of the panel members in accordance with a statistical design.

After a period of five hours, the underarm odour was judged by three trained female assessors who scored the odour intensity in accordance with a 0 to 5 scale, as shown below:

Score	Odour level	Conc. of aqueous isovaleric acid (ml/l)
0	No odour	0
1	Slight	0.013
2	Definite	0.053
3	Moderate	0.22
4	Strong	0.87

5	Very Strong	3.57
---	-------------	------

Average scores for each test product and the control product were then determined. The score for each test product was subtracted from the score for the control product and the reduction expressed as a percentage to give the Odour Reduction Value(%).

Perfume compositions A to E were all found to exhibit significant deodorant activity.

For example, Perfume A contains 35% of perfume components of the invention. Excluding diluents, this percentage increases to 42.2%. For this perfume, present at 1.0% in an aerosol product of Formulation 2C above, the Odour Reduction Value(%) compared to an unperfumed control was 48.3% (5 hours).

The Odour Reduction Value (%) compared to an unperfumed control for Perfume B was 44.6% (5 hours), for Perfume C 35.3% (5 hours) and for Perfume E 28.2% (5 hours).

CLAIMS

1. A perfume composition comprising at least 30% by weight of one or more of the following perfume components; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, dihydromyrcenol, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, alpha-terpineol, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.
2. A perfume composition comprising at least 3 of the following perfume components; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, dihydromyrcenol, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, alpha-terpineol, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.
3. A perfume composition according to claim 2, wherein the perfume composition comprises at least 30% by weight of at least 3 of the specified perfume components.

4. A deodorant product comprising a perfume composition according to any one of claims 1, 2 or 3.

5. Use of one or more of the following perfume components; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal, as a deodorant active.

6. Use of one or more of the following perfume components; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal, in the manufacture of a composition for reducing or preventing body malodour.

7. A method for reducing or preventing body malodour by topically applying to human skin a composition comprising a perfume component selected from at least one of the following; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-

methylphenyl)butanamide, dihydromyrcenol, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, alpha-terpineol, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.

8. A method according to claim 7 wherein the perfume component is selected from at least one of the following; Armoise Tunisian oil, para-tert.butylphenylacetonitrile, dihydrolinalol, N-ethyl-N-(3-methylphenyl)propionamide, 4-(5-ethylbicyclo[2.2.1]heptyl-2)-cyclohexanol, ethyltricyclo[5.2.1.0{2,6}]decane-2-carboxylate, 2-ethyl-N-methyl-N-(3-methylphenyl)butanamide, (4-isopropylcyclohexyl)methanol, 3-methyl-5-phenylpentan-1-ol, 2,2,2-trichloro-1-phenylethyl acetate, isobornyl acetate, allyl amyl glycolate, acetyl cedrene, tetrahydrogeraniol, citronellal, cuminic aldehyde, 1,3,3-trimethyl-2-norbornanyl acetate, cis-jasmone, methyl octyl acetaldehyde, gamma-octalactone, octyl acetate, pine American oil, peppermint (Chinese), 1,3,3-trimethyl-2-norbornanol, gamma-nonalactone, octahydro-2H-chromen-2-one, cis-4-decenal, 3-(3-isopropylphenyl)butanal.

9. A method according to claim 7 or 8, wherein the composition is a perfume composition.

10. A method according to claim 9, wherein the perfume composition comprises at least 30% by weight of at least one of the specified perfume components.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/03/03083

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 C11B9/00 A61Q13/00 A61Q15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 C11B A61Q A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Section Ch, Week 199430 Derwent Publications Ltd., London, GB; Class D21, AN 1994-245645 XP002027043 & JP 06 179610 A (SHISEIDO CO LTD), 28 June 1994 (1994-06-28) abstract --- WO 96 04940 A (PROCTER & GAMBLE) 22 February 1996 (1996-02-22) page 3, line 5 -page 7, line 2 claim 1 ---	1-10
X	---	1-3

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the International filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the International filing date but later than the priority date claimed

- "T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the International search 9 October 2003	Date of mailing of the International search report 23/10/2003
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer Dekeirel, M

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB/03083

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 57233 A (PERRING KEITH DOUGLAS ;PIDDOCK CHRISTOPHER CHARLES (GB); CLEMENTS) 11 November 1999 (1999-11-11) page 9, line 6 -page 12, line 14 claims 1,3 ---	1-3
X	WO 94 13766 A (BAKKER PIETER ;QUEST INT (NL)) 23 June 1994 (1994-06-23) example 2 ---	1-3
X	WO 02 39971 A (COLGATE PALMOLIVE CO) 23 May 2002 (2002-05-23) claims 1-4 ---	1,4-9
X	WO 96 30470 A (QUEST INT ;SELL CHARLES STANLEY (GB)) 3 October 1996 (1996-10-03) page 2, line 10 - line 37 page 4, line 4 - line 34 page 5, line 24 - line 25 claim 1 ---	1,4-10
X	WO 02 49600 A (BEHAN JOHN MARTIN ;PERRING KEITH DOUGLAS (GB); MCNULTY DAVID (GB);) 27 June 2002 (2002-06-27) examples 1-6,10 ---	2
X	WO 99 44575 A (COLGATE PALMOLIVE CO) 10 September 1999 (1999-09-10) claims 1-6,11-13 ---	2,4-9
X	EP 1 029 841 A (GIVAUDAN ROURE INT) 23 August 2000 (2000-08-23) page 3, line 43 - line 50 example 4 claims 1,2,4,5 ---	2
X	EP 1 113 105 A (INT FLAVORS & FRAGRANCES INC) 4 July 2001 (2001-07-04) examples A,B claims 1,7 ---	1,6-10
X	WO 01 24769 A (BRETLER GIL ;FIRMENICH & CIE (CH)) 12 April 2001 (2001-04-12) claims 1-7 ---	1,4-10
X	WO 00 01361 A (BEHAN JOHN MARTIN ;PERRING KEITH DOUGLAS (GB); QUEST INT (NL)) 13 January 2000 (2000-01-13) page 6, Table 2 page 4, line 5 - line 10 claims 1,6-12 ---	5-19
		-/-

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/GB03/03083

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 01352 A (BEHAN JOHN MARTIN ;MINHAS TONY (GB); PROVAN ALAN FORBES (GB); WILS) 13 January 2000 (2000-01-13) example 2 ----	5-9
X	DATABASE WPI Section Ch, Week 200118 Derwent Publications Ltd., London, GB; Class D22, AN 2001-173130 XP002257152 & JP 2000 355696 A (KAO CORP), 26 December 2000 (2000-12-26) abstract ----	1
P,X	WO 03 000648 A (YARWOOD KIM JOYCE ;SWIFT KARL ANDREW DEAN (GB); QUEST INTERNAT B V) 3 January 2003 (2003-01-03) page 4, paragraph 2 claims 1,4-7 -----	1,4-10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB93/03083

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
JP 6179610		A	28-06-1994	JP	3024865 B2	27-03-2000
WO 9604940	A	22-02-1996	US	5939060 A	17-08-1999	
			AU	3242995 A	07-03-1996	
			BR	9508569 A	23-12-1997	
			CA	2196702 A1	22-02-1996	
			CA	2330720 A1	22-02-1996	
			CZ	9700401 A3	13-08-1997	
			DE	29522186 U1	15-06-2000	
			EP	1002549 A1	24-05-2000	
			EP	1232761 A1	21-08-2002	
			EP	0774980 A1	28-05-1997	
			JP	10503958 T	14-04-1998	
			JP	2002069840 A	08-03-2002	
			PL	318553 A1	23-06-1997	
			RU	2149025 C1	20-05-2000	
			WO	9604940 A1	22-02-1996	
			US	6146621 A	14-11-2000	
			US	5663134 A	02-09-1997	
			US	5783544 A	21-07-1998	
			US	2003005522 A1	09-01-2003	
			US	6248135 B1	19-06-2001	
			US	5670475 A	23-09-1997	
			US	2001044392 A1	22-11-2001	
			US	6077318 A	20-06-2000	
WO 9957233	A	11-11-1999	AU	3835399 A	23-11-1999	
			WO	9957233 A1	11-11-1999	
WO 9413766	A	23-06-1994	AT	140723 T	15-08-1996	
			AU	5811294 A	04-07-1994	
			BR	9307615 A	15-06-1999	
			DE	69303830 D1	29-08-1996	
			WO	9413766 A2	23-06-1994	
			EP	0673408 A1	27-09-1995	
			ES	2089913 T3	01-10-1996	
			JP	2839881 B2	16-12-1998	
			JP	10245584 A	14-09-1998	
			JP	2933719 B2	16-08-1999	
			US	5698253 A	16-12-1997	
			ZA	9309286 A	12-06-1995	
WO 0239971	A	23-05-2002	AU	2889902 A	27-05-2002	
			WO	0239971 A2	23-05-2002	
WO 9630470	A	03-10-1996	AU	700662 B2	14-01-1999	
			AU	5109296 A	16-10-1996	
			BR	9607764 A	19-01-1999	
			DE	69613823 D1	16-08-2001	
			DE	69613823 T2	22-11-2001	
			WO	9630470 A1	03-10-1996	
			EP	0819161 A1	21-01-1998	
			ES	2160235 T3	01-11-2001	
			JP	11506475 T	08-06-1999	
			US	5856295 A	05-01-1999	
WO 0249600	A	27-06-2002	AU	1620402 A	01-07-2002	
			EP	1343466 A1	17-09-2003	

INTERNATIONAL SEARCH REPORT

 International application No
 PCT/G[REDACTED]/03083

Patent document cited in search report	Publication date		Patent family member(s)		Publication date
WO 0249600	A	WO	0249600 A1		27-06-2002
WO 9944575	A	10-09-1999	US 6180121 B1 AU 749473 B2 AU 3311999 A BR 9908579 A CA 2322284 A1 EP 1061894 A1 HU 0101149 A2 JP 2002505264 T NO 20004391 A PL 342653 A1 WO 9944575 A1 ZA 9901768 A		30-01-2001 27-06-2002 20-09-1999 21-11-2000 10-09-1999 27-12-2000 28-08-2001 19-02-2002 03-11-2000 02-07-2001 10-09-1999 11-10-2000
EP 1029841	A	23-08-2000	EP 1029841 A1 AT 236865 T AU 1760100 A BR 0000850 A CN 1266838 A DE 60001997 D1 JP 2000239691 A SG 83775 A1 US 6297211 B1 ZA 200000724 A		23-08-2000 15-04-2003 24-08-2000 21-08-2001 20-09-2000 15-05-2003 05-09-2000 16-10-2001 02-10-2001 21-05-2000
EP 1113105	A	04-07-2001	US 6379658 B1 BR 0001834 A EP 1113105 A2		30-04-2002 11-09-2001 04-07-2001
WO 0124769	A	12-04-2001	BR 0014476 A EP 1221934 A1 WO 0124769 A1 JP 2003510343 T US 2002142364 A1		04-06-2002 17-07-2002 12-04-2001 18-03-2003 03-10-2002
WO 0001361	A	13-01-2000	AU 4636999 A EP 1093358 A1 WO 0001361 A1		24-01-2000 25-04-2001 13-01-2000
WO 0001352	A	13-01-2000	AU 4630599 A BR 9911897 A EP 1094784 A1 WO 0001352 A1 JP 2002519367 T		24-01-2000 27-03-2001 02-05-2001 13-01-2000 02-07-2002
JP 2000355696	A	26-12-2000	NONE		
WO 03000648	A	03-01-2003	WO 03000648 A1		03-01-2003